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EXAMINER	
FORMAN, BETTY J	

ART UNIT	PAPER NUMBER
1634	

NOTIFICATION DATE	DELIVERY MODE
12/20/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

IPOPS.LEGAL@agilent.com

Office Action Summary	Application No.	Applicant(s)	
	10/828,357	PECK ET AL.	
	Examiner	Art Unit	
	BJ Forman	1634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 October 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) *25-33* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

FINAL ACTION

Status of the Claims

This action is in response to papers filed 12 October 2007 in which claims 11 and 24 were amended. The amendments have been thoroughly reviewed and entered.

The previous rejections in the Office Action dated 12 July 2007, not reiterated below, are withdrawn in view of the amendments. Applicant's arguments have been thoroughly reviewed and are discussed below as they apply to the instant grounds for rejection. New grounds for rejection, necessitated by the amendments, are discussed.

Claims 1-24 are under prosecution.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 11-24 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 11-24 are indefinite in Claim 11 and 24 because the claims are drawn to a method of fabricating an array having features of different sizes. However, the steps of the method do not produce different sized spots. The claims, as written, encompass activating a single ejector to deposit a volume and forming a spot based on ligand concentration. The claims do not define fabrication of different sized features. Therefore, it is unclear whether the method step accomplishes the asserted purpose of array fabrication.

Response to Comments

4. Applicant asserts that the amendments adequately address the previous rejection. However, it is maintained that the claims are still indefinite. The preamble states the intended

purpose of the method "fabricating a chemical array of biopolymeric ligands with multiple features of different sizes". However, the method steps do no accomplish purpose as stated in the preamble i.e. the steps do not produce features of different sizes. The claims merely require fabricating an array of features, each having a size based on its compositions. The claims do not require different sizes or different biopolymeric ligands or different compositions upon which the size is based. As such, it is unclear whether the method accomplishes the intended purpose. Furthermore, the meets and bounds of the claims are unclear.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirota et al (U.S. Patent No. 6,753,144, filed 21 June 2001) in view of Blanchard (U.S. Patent No. 6,419,883, issued 16 July 2002).

Regarding Claim 1, Hirota et al disclose a method for fabricating an array of biopolymers with different feature sizes (Fig. 14), the method comprising modulating a waveform to at least one orifice ejector (discharge port, #54, Fig. 6) to dispense volumes of fluid from the orifice wherein the volume is based on modulated waveform (Column 11, lines 62-Column 12, line 45, Fig. 9). Hirota et al disclose the method wherein the array is fabricated by desired arrangements (Abstract, Column 4), which clearly suggests a planned layout is provided prior to fabrication. Hirota et al do not specifically teach layout determination.

However, determining a layout prior to array fabrication was well known and routinely practiced in the art at the time the claimed invention was made as taught by Blanchard (§ 5.5.2). Blanchard teaches software and hardware used to provide waveform signals for fabricating the array thereby providing a fully automated and efficient system for array fabrication (Column 3, lines 50-55 and Column 4, lines 19-50). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to apply the programmed synthesis of Blanchard to the array construction of Hirota et al. One of ordinary skill in the art would have been motivated to do so with a reasonable expectation of success and for the added benefit of providing a fully automated and efficient system for array fabrication as taught by Blanchard (Column 3, lines 50-55 and Column 4, lines 19-50).

Regarding Claim 2, Hirota et al teach the method wherein at least two features have different size (Fig. 14).

Regarding Claim 3, Hirota et al teach the method wherein the two features of different size have the same probe composition (Fig. 14B).

Regarding Claim 4, Hirota et al teach the method wherein the two features of different size have differing probe composition (Fig. 14A).

Regarding Claim 5, Hirota et al teach the method wherein the fabrication is via fluid drop deposition (Column 12, lines 13-45).

Regarding Claim 6, Hirota et al teach the method wherein the fluid deposition uses at least one head and comprises modulating an activation signal for each ejector (Column 12, lines 13-45).

Regarding Claim 7, Hirota et al teach the method wherein the deposition is completely controlled to produce drops of desired and differing size (Column 12, lines 26-45), which clearly suggests using a processor for complete control, but the reference is silent regarding use of a processor.

However, programmed deposition for array fabrication was well known and routinely practiced in the art at the time the claimed invention was made as taught by Blanchard (§ 5.5.2). Blanchard teaches software and hardware used to provide waveform signals for fabricating the array thereby providing a fully automated and efficient system for array fabrication (Column 3, lines 50-55 and Column 4, lines 19-50). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to apply the programmed synthesis of Blanchard to the array construction of Hirota et al. One of ordinary skill in the art would have been motivated to do so with a reasonable expectation of success and for the added benefit of providing a fully automated and efficient system for array fabrication as taught by Blanchard (Column 3, lines 50-55 and Column 4, lines 19-50).

Regarding Claim 8, Hirota et al teach the method wherein the ejector is a piezoelectric ejector (Column 11, lines 20-24). And Blanchard teach the similar method wherein the ejector is a piezoelectric ejector (Column 5, lines 1-2).

Regarding Claim 9, Hirota et al disclose the method fabricates an nucleic acid array (Column 6, lines 30-45). And Blanchard teaches the similar method produces a nucleic acid array (Column 6, lines 6-30).

Regarding Claim 10, Blanchard teaches the similar method produces a peptide array (Column 6, lines 6-30).

Regarding Claim 11, Hirota et al disclose a method for fabricating an array of biopolymers with different feature sizes (Fig. 14), the method comprising modulating a waveform to at least one orifice ejector (discharge port, #54, Fig. 6) to dispense volumes of fluid from the orifice wherein the volume is based on modulated waveform (Column 11, lines 62-Column 12, line 45, Fig. 9). Hirota et al disclose the method wherein the array is fabricated by desired arrangements (Abstract, Column 4), which clearly suggests a planned layout is provided prior to fabrication. Hirota et al do not specifically teach layout determination.

However, determining a layout prior to array fabrication was well known and routinely practiced in the art at the time the claimed invention was made as taught by Blanchard (§ 5.5.2). Blanchard teaches software and hardware used to provide waveform signals for fabricating the array thereby providing a fully automated and efficient system for array fabrication (Column 3, lines 50-55 and Column 4, lines 19-50). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to apply the programmed synthesis of Blanchard to the array construction of Hirota et al. One of ordinary skill in the art would have been motivated to do so with a reasonable expectation of success and for the added benefit of providing a fully automated and efficient system for array fabrication as taught by Blanchard (Column 3, lines 50-55 and Column 4, lines 19-50).

Regarding Claim 12, Hirota et al disclose the method wherein multiple spots of different sizes are produced via deposition of different volumes, which is controlled by voltage waveform (Column 11, lines 13-35).

Regarding Claim 13, Hirota et al disclose the method wherein the sample reservoirs are aligned above the discharge ports, each to discharge differing fluids (Column 10, lines 10-20) and further exemplify spots of different size having the same composition (Column 15, lines 24-35, Fig. 14B). Hence, the reference anticipates deposition of spots having different size from the same orifice.

Regarding Claim 14, Hirota et al disclose the method wherein the sample reservoirs are aligned above the discharge ports, each to discharge differing fluids (Column 10, lines 10-20) and further exemplify spots of the same size having the same composition (Column 15, lines 8-23, Fig. 14A). Hence, the reference anticipates deposition of spots having different size from a different orifice.

Regarding Claim 15, Hirota et al disclose the method wherein the dispensers deposit spots of different volume based on waveform applied to each dispenser (Column 12, lines 13-35).

Regarding Claim 16, Hirota et al disclose the method wherein differing waveforms are applied to a dispenser for dispensing different volumes from the same dispenser (Column 12, lines 13-45).

Regarding Claim 17, Hirota et al disclose the method wherein differing waveforms are applied to each dispenser for dispensing different volumes from the different dispensers (Column 12, lines 13-45).

Regarding Claim 18, Hirota et al disclose the method wherein the modulating step includes an activation signal (Column 12, lines 13-17).

Regarding Claim 19, Hirota et al disclose a method of Claim 11 for fabricating an array of biopolymers with different feature sizes (Fig. 14), the method comprising modulating a waveform to at least one orifice ejector (discharge port, #54, Fig. 6) to dispense volumes of fluid from the orifice wherein the volume is based on modulated waveform (Column 11, lines 62-Column 12, line 45, Fig. 9) and further teach the method wherein the modulating step includes an activation signal (Column 12, lines 13-17) wherein the deposition is completely controlled to produce drops of desired and differing size (Column 12, lines 26-45), which clearly suggests using a database/processor for complete control, but the reference is silent regarding use of a database.

However, programmed deposition for array fabrication was well known and routinely practiced in the art at the time the claimed invention was made as taught by Blanchard (§ 5.5.2). Blanchard teaches software and hardware used to provide waveform signals for fabricating the array thereby providing a fully automated and efficient system for array fabrication (Column 3, lines 50-55 and Column 4, lines 19-50). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to apply the programmed synthesis of Blanchard to the array construction of Hirota et al. One of ordinary skill in the art would have been motivated to do so with a reasonable expectation of success

and for the added benefit of providing a fully automated and efficient system for array fabrication as taught by Blanchard (Column 3, lines 50-55 and Column 4, lines 19-50).

Regarding Claim 20-21, Hirota et al teach the method produces a nucleic acid array (Column 6, lines 36-40) but the reference does not teach in situ synthesis using phosphoramidite fluid and activator fluid. However, in situ synthesis was well known and routinely practiced at the time the claimed invention was made as taught by Blanchard.

Blanchard teaches the method deposits droplets of phosphoramidites and activator (Column 13, line 40-Column 14, lines 67) wherein the dispenser provides the defined reagents accurately for simple and direct synthesis (Column 10, lines 28-45). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to apply the in situ synthesis of Blanchard to the device and method of Hirota et al. One of ordinary skill in the art would have been motivated to do so for the expected benefit of simple and direct synthesis of probe spots having differing sizes as desired by Hirota et al.

Regarding Claim 22, Hirota et al disclose the method fabricates an nucleic acid array (Column 6, lines 30-45). And Blanchard teaches the similar method produces a nucleic acid array (Column 6, lines 6-30).

Regarding Claim 23, Blanchard teaches the similar method produces a peptide array (Column 6, lines 6-30).

Regarding Claim 22, Hirota et al disclose the method fabricates an nucleic acid array (Column 6, lines 30-45).

Regarding Claim 24, Hirota et al disclose a method for fabricating an array with different feature sizes (Fig. 14), the method comprising modulating a waveform to at least one orifice ejector (discharge port, #54, Fig. 6) to dispense volumes of fluid from the orifice wherein the volume is based on modulated waveform (Column 11, lines 62-Column 12, line 45, Fig. 9). Hirota et al disclose the method wherein the array is fabricated by desired arrangements

(Abstract, Column 4), which clearly suggests a planned layout is provided prior to fabrication. Hirota et al do not specifically teach layout determination.

However, determining a layout prior to array fabrication was well known and routinely practiced in the art at the time the claimed invention was made as taught by Blanchard (§ 5.5.2). Blanchard teaches software and hardware used to provide waveform signals for fabricating the array thereby providing a fully automated and efficient system for array fabrication (Column 3, lines 50-55 and Column 4, lines 19-50). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to apply the programmed synthesis of Blanchard to the array construction of Hirota et al. One of ordinary skill in the art would have been motivated to do so with a reasonable expectation of success and for the added benefit of providing a fully automated and efficient system for array fabrication as taught by Blanchard (Column 3, lines 50-55 and Column 4, lines 19-50).

Response to Arguments

7. Applicant asserts that Hirota in combination with Blanchard fails to teach all elements of the claimed invention. Applicant asserts that Hirota does not teach determining a chemical array layout in which each feature has a size based on its ligand composition and does not suggest this aspect because Hirota merely teaches array with different feature sizes but does not suggest the size is based on composition. Applicant further asserts that Blanchard teaches determining layout prior to array fabrication but does not disclose feature size based on composition. From this, Applicant assert the combination of Hirota and Blanchard fails to teach the claimed invention.

The arguments have been considered but are not found persuasive. Applicant appears to be asserting that the claimed features require different biopolymeric ligands and different sized features for each of the different biopolymeric ligands. However, the claims are not so limited. The claims merely define methods for fabricating array of biopolymeric ligands,

determining array layout in which feature size is based on biopolymeric ligand composition. While the **preamble** of Claims 11 and 24 define fabrication of different size features, the method steps do not define production of different sized features. Furthermore, only Claim 2, which depends from Claim 1, defines different sized feature, and this claim only requires two features having different size. And only Claim 4, which depends from Claim 1, requires features having different composition. Hence, any assertion that the claimed methods produce arrays having different sized features and/or different sized features based on a difference in composition is not commensurate in scope with the claims.

Furthermore, Hirota clearly teaches fabrication of an array having features of different sizes wherein the sizes are based on composition (i.e. DNA amount (concentration) or DNA species). A partial discussion of Fig. 14 from Hirota (as cited above) is provided below (Column 15, lines 1-24):

> In the embodiment of the present invention, as shown in FIG. 14A, a plurality of spots having different spot sizes can be formed on the base plate. In the example shown in FIG. 14A, when different amounts of DNA are immobilized on the spots, or when different species of DNA having different efficiencies of hybridization with a specimen are immobilized for the respective spots 1A to 3D with different types of DNA fragments, then the size of the spot, i.e., the diameter of the circular configuration in general is changed.
>
> Specifically, the spots are formed as follows. That is, the spot diameter is large for each of the spots 1A, 1D, 2B, 2C, 2D, 3A, 3D in which the amount of DNA immobilized on the spot is small, or in which the DNA species having a low efficiency of hybridization with the specimen is immobilized. The spot diameter is intermediate for each of the intermediate spots 1B, 2A, 3B. The spot diameter is small for each of the spots 1C, 3C in which the amount of DNA immobilized on the spot is large, or in which the DNA species having a high efficiency of hybridization with the specimen is immobilized. Therefore, it is possible to suppress the dispersion of the ability to capture the specimen. Further, it is possible to suppress the deterioration of the quantitative performance and the dispersion

of the inspection result which would be otherwise caused by the difference in detection sensitivity between the spots.

As such, Hirota clearly teaches feature sizes based on "composition" (i.e. amount of DNA or DNA species), both of which are encompassed by the broadly defined "composition.

Furthermore, as Applicant notes (page 11 or the Response) Blanchard teaches determining a layout prior to array fabrication. Specifically, Blanchard teaches "the name of an oligo specification files storing the geometry of the desired patterns to be deposited in a particular wafer" (Column 34, lines 1-4). Hence, as noted by Applicant, Blanchard specifically teaches an array layout based on oligos to be deposited.

It is maintained that the combination of Hirota and Blanchard make obvious the instantly claimed invention.

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Conclusion

9. No claim is allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BJ Forman whose telephone number is (571) 272-0741. The examiner can normally be reached on 6:00 TO 3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ram Shukla can be reached on (571) 272-0735. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to (571) 272-0547.

Patent applicants with problems or questions regarding electronic images that can be viewed in the Patent Application Information Retrieval system (PAIR) can now contact the USPTO's Patent Electronic Business Center (Patent EBC) for assistance. Representatives are available to answer your questions daily from 6 am to midnight (EST). The toll free number is (866) 217-9197. When calling please have your application serial or patent number, the type of document you are having an image problem with, the number of pages and the specific nature of the problem. The Patent Electronic Business Center will notify applicants of the resolution of the problem within 5-7 business days. Applicants can also check PAIR to confirm that the problem has been corrected. The USPTO's Patent Electronic Business Center is a complete service center supporting all patent business on the Internet. The USPTO's PAIR system provides Internet-based access to patent application status and history information. It also enables applicants to view the scanned images of their own application file folder(s) as well as general patent information available to the public.

For all other customer support, please call the USPTO Call Center (UCC) at 800-786-9199.

BJ Forman, Ph.D.
Primary Examiner
Art Unit: 1634
December 17, 2007